

The entire damage is conservatively estimated at \$250,000.

The storm was severest at Alton, but was very heavy along the river, particularly on the east side, from slightly above Alton to a short distance below St. Louis. In St. Louis rain fell from 2.32 a. m. to 4.52 a. m.; the total amount was 3.16 inches, of which 2.95 inches fell in one hour. This is the heaviest rainfall for one hour ever recorded in St. Louis. The nearest approach to it was in 1873, when 2.93 inches fell in one hour on June 9.

The weather chart prepared on observations made at 7 a. m., July 14, showed gradually increasing pressure from a depression over the Rocky Mountain slope (with its center near Winnipeg, Manitoba) to a wave of high pressure over the Atlantic seaboard; in the 24 hours just ended there had been no rain in the Mississippi Valley except over the limited territory covered by the storm just described.

SEVERE THUNDER STORM AT MINNEAPOLIS, MINN., JULY 12, 1912.

By MARTIN R. HOVDE, Assistant Observer.

Late in the afternoon of July 12, 1912, an unusually severe thunderstorm passed over Minneapolis. Excepting the tornadic disturbance of August, 1904, the storm was the most terrific the city had ever experienced. The morning weather map revealed an area of low pressure extending from the Canadian Province of Manitoba southward to Mexico with its center over eastern South Dakota and Nebraska. It foreboded unsettled weather and showers for eastern Minnesota. The day opened with light to fresh southeasterly and southerly winds, and occasional showers. By midday the temperature began to rise rapidly and the sky became generally clear. The barometer was falling slowly. Shortly before 4 p. m. the sky clouded rapidly in the west and southwest, and the thunderstorm and darkness approached. At 4.35 p. m. the rain began to fall at an excessive rate coincident with the sudden, outrushing squall. At 4.36 p. m. the extreme wind velocity was 90 miles an hour and for a five-minute period, 80 miles. Backing winds indicated a passage to the south of station. After a short interval (about 20 minutes) excessive rain set in again, 0.7 inch being recorded in 15 minutes. Before the hour had passed another storm was passing, winds now veering to southwest. An extreme velocity of 60 miles an hour was recorded at 6.07 p. m. The suddenness and severity of the winds may be inferred when one considers that the total wind movement for the hour of 4 to 5 and 6 to 7 p. m. were but 23 and 6 miles, respectively.

The total damage is conservatively estimated at \$25,000, confined principally to erosion of streets, blowing away of awnings, signs, etc., breakage of trees and windows, and flooding of low places and basements. Three lives were lost and a score of people were injured.

In a storm of this nature many curious and interesting experiences happen. A few are given, taken from the local press:

J. H. Rose saw the wind lift Leonard Gripp's garage from its foundation next door and carry the building 50 feet away. The automobile was left on the floor unharmed.

Fire Chief Ringer had to open the auto doors to let the rain water out of the machine while motoring to a fire.

Assistant Fire Chief Hamilton's auto was submerged in the street while responding to an alarm.

A strong gust of wind seized a delivery wagon and rolling the horse and wagon over and over carried the outfit across the street and dumped it down a steep incline into a ditch.

WISCONSIN RIVER FLOOD, JULY, 1912.

By JAMES H. SPENCE, Local Forecaster, Dubuque, Iowa.

The Wisconsin River flood from Rothschild to Merrill on the 23d and 24th of July, 1912, was one of the worst, if not the worst, on record for that section of the country. Conservative estimates place the loss at more than one-half million dollars. Torrential rains fell on the 23d immediately north and northeast of Wausau. At Merrill, Lincoln County, 11.25 inches was recorded. Only an inch fell at Grand Rapids, and 1.16 inches at Rhineland, while Wausau reports 4.50 inches; Prentice, 5.09 inches; Koepenick, 3.20 inches; and Antigo, 6.03 inches.

It was the great rainfall in Lincoln County that caused the flood. The result of the enormous downpour at Merrill is thus described in the Grand Rapids, Wis., Reporter, by Hon. Neal Brown, of Wausau:

A wall of water came down the river, taking out one dam after another. At Brokaw they didn't even have time to open the gates.

Mr. Brown further states in the Reporter that the flood loss is several hundred thousand dollars, and that among the dams carried out were the Wisconsin River Dam at Merrill; the Prairie River Dam of the Merrill Paper Co.; the Brokaw dam; the guard-lock Dam at Wausau; a small dam of the Wausau Street Railroad Co.; a part of the Brooks & Ross Dam at Schofield; while the cofferdam of the Marathon Paper Mills at Rothschild was blown out to relieve the pressure. Four bridges at Wausau and one at Schofield were carried out in whole or in part. Several million feet of logs between Wausau and Merrill were carried downstream, but a large amount was recovered. (See also Mr. Brown's letter at the close of this report.)

In an account of the flood the Wausau Record-Herald of July 24, 1912, says:

The "Old Wisconsin" went on a tear last night and continued the work of devastation to-day. The heavy and constant rainfall of 24 hours resulted in an extraordinary high stage of water last night, and about 10 o'clock the dam at Brokaw gave way, being unable to stand the strain. A telephone alarm was at once sent to this city, but before precautionary measures could be taken the crest of the flood was here. The water rose to an unusual height, said to be greater than for years.

As a matter of fact, the water at Wausau rose to 15.3 feet, or the highest ever known there by nearly 2 feet. It was about 1.8 feet higher than in September, 1881; about 4.1 feet higher than in September, 1900; and 4 feet higher than in October, 1911. The rise was from 3.6 feet at 7 a. m. of the 23d to 15.3 feet at about 10.30 a. m. of the 24th, or 11.7 feet in 27½ hours.

Mr. A. W. Trevill, postmaster at Wausau, reports as follows relative to the flood:

WAUSAU, WIS., July 30, 1912.

Information here given was obtained from the parties sustaining the loss, and is, I think, a fair estimate:

Barker & Stewart Lumber Co.	\$20,000
J. Mortenson Lumber Co.	25,000
Wausau Street R. R. Co.	20,000
A. Kickbusch Grocery Co.	3,000
The Northern Milling Co.	1,500
Badger Turpentine Co.	3,000
B. Heineman Lumber Co.	5,000
Brokaw Paper Co.	30,000
Marathon Paper Co.	30,000
John Manser Saw Mill.	10,000
Brooks & Ross Lumber Co.	10,000
City of Wausau.	35,000
Chicago, Milwaukee & St. Paul R. R.	20,000
Chicago & Northwestern R. R.	20,000
Total	232,500

The flood was not caused by the going out of the Brokaw Dam, but by the heavy rains in this locality and farther north. In fact, Merrill, 15 miles above Brokaw, had as highwater as Wausau, if not higher. Only about 125 feet of the Brokaw Dam went out, and that was an earth embankment, which went out slowly, so that it had little if any effect on the river below. It was noticed at 9 or 10 p. m. that the river was rising fast here. Rain had fallen all day here, a total of 4.5 inches. At Merrill, 18 miles above us, 11.25 inches fell during the 24 hours of the 23d of July, and they had such a rain over quite a large territory.

The damage was not all confined to the vicinity of Wausau. There were numerous losses at Merrill, and also in towns on some of the small tributaries of the Wisconsin.

As soon as the severity of the flood at Wausau was known, flood warnings were issued for Stevens Point, Grand Rapids, and Nekoosa. Later special forecasts of high water were issued from the mouth of the Wisconsin River to Kilbourn. These were of some value, but the flood crest "flattened out" quickly, and little damage resulted below Stevens Point. At Stevens Point, according to the newspapers, the highest stage was only 6 inches below the highest stage of last October, and some farmers sustained severe losses. Growing crops were ruined, and considerable rye in shock was swept away.

The highest water at most points from Grand Rapids to the mouth of the Wisconsin River was from 2 to 3 feet below the highest stage reached during last October's flood, as shown by the following table:

	October, 1911.	July, 1912.
	<i>Feet.</i>	<i>Feet.</i>
Wausau, Wis.....	11.3	15.3
Grand Rapids, Wis.....	13.6	10.9
Portage, Wis.....	12.9	10.1
Muscoda, Wis.....	9.8	6.9

The water rose 11 7 feet in 27½ hours at Wausau; 10.1 feet in 3 days, 5 hours at Grand Rapids, and 6.8 in about 4 days at Portage. About a day longer was required for the flood crest to travel from Wausau to the mouth of the Wisconsin River than last October.

Warnings to Wausau and vicinity from this office were impossible. The rainfall that caused the flood was of the nature of a cloudburst in the vicinity of Merrill, and the rise of the river was so rapid that the damage was done in the valley from Rothschild to Merrill almost before the people were aware of the danger.

Telegraph wires were taken down by the storm, and no word of the severity of the storm or flood reached this office until many hours after the damage was done.

This office wrote to Mr. Brown for further information concerning the flood, and under date of August 6, 1912, he says in part:

The dam that went out on Prairie River was a 15-foot dam near the city of Merrill, and used by the Merrill Paper Co. The pondage of this

dam was not large, but added something to the volume of water that destroyed property in Merrill and below.

I have been east of here since the flood over different routes. The general boundaries of the cloudburst, as near as I can estimate, are as follows: It commenced some short distance west of Merrill, and extended both north and south of Merrill a short distance. I should judge in a general way this strip was about 20 miles in width north and south. It extended in a southeast direction through the northeast part of Marathon County. Antigo seems to have been on the northern edge. I think directly east of here, about 25 miles, was the center of heaviest precipitation. How far it extended in an easterly direction I do not know, but I think as far as the Wolf River, probably farther.

On what is called the west branch of the Wolf River, on the Indian reservation, a small stream running in above the Neopit mill, there were four dams that I know of. The one called the Pinchot dam and the Pine dam below it were taken out. The two upper dams on this stream remain, so far as I can learn. Southeast of the village of Phlox the Government road crosses this stream on a timber bridge. I was there, and as near as I can make out the full force of the cloudburst was a little south of this point, because this bridge was intact. When the Pinchot dam went out the river gouged out its old channel through the pond, so that it looks like a gigantic furrow, with stumps and logs and trees thrown up on each side.

On all the streams that extended through the heavy flood area the water was the highest ever known. In some cases the topography and shores of the streams were changed. Old dams that had been in 25 years or more were utterly swept away. Trees and bushes along the shore were uprooted. In places where gigantic trees had fallen across one of these streams perhaps more than half a century ago they were taken out and piled up on the shore.

I think at least half of the bridges and dams in the flood area were taken out. I saw iron bridges on small streams that had been carried bodily away. In this flood area I saw settlers, living on fairly level farms, who told me their farms looked like a lake. In many instances the water was 4 or 5 feet above highways that had theretofore been above the highest flood known.

The highway bridge in the village of Schofield was carried completely out. This was an iron bridge with concrete abutments. One of the middle abutments was also taken out. Three miles above this, on the same river, the Eau Claire, the highway bridge and dam were taken out. Two miles farther up another old dam was taken out.

I understand about 50 highway bridges were taken out in this county. I presume this is underestimated, if we include many smaller bridges. West from the Wisconsin River in this county no particular damage was done.

Flood losses at Merrill, Wis., and in Lincoln County reported by Postmaster F. W. Kubasta, under date of August 9, 1912, are as follows:

Merrill Railway & Lighting Co., damage to dam and plant....	\$30,000
Grandfather Falls Co., damage to dam and plant and pulp wood lost.....	25,000
Lindaur Pulp & Manufacturing Co., damage to plant and pulp wood lost.....	30,000
Merrill Excelsior Co., damage to grounds and wood lost.....	10,000
A. Arveson Excelsior Co., wood lost.....	2,500
Wright Lumber Co., damage to grounds and mill, and lumber lost.....	5,000
A. H. Stange Co., damage to grounds and railway track, and lumber lost.....	10,000
Merrill Boom Co., damage to dam.....	15,000
Damage to city parks, streets, etc.....	15,000
Minor losses.....	7,500
Damage to roads, bridges, etc., in Lincoln County.....	60,000
Total.....	210,000